Short report

Epidemiological study of *Chlamydia trachomatis* infection in pregnant women in Hungary

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A multicentre survey was carried out in order to determine the prevalence and risk factors of *Chlamydia trachomatis* infection in the pregnant population in Hungary. The nucleic acid hybridisation method (PACE 2 Gen-Probe) was applied for the examination of *C trachomatis*. The overall average prevalence of *C trachomatis* cases during an 18 month survey on 6161 pregnant women was 5.87%. There were significant differences in the proportions of chlamydial infection in the different survey centres, and also in the different age groups and the different family status groups. The perinatal mortality rate exhibited a significantly higher prevalence (8.52%) among *C trachomatis* positive than among negative patients (2.03%). In the anamnestic histories of *C trachomatis* infected patients, the frequency of premature uterine activity was 8.13%, in contrast with 5.18% in the non-infected group ($p<0.05$). We suggest that all pregnant women be tested for *C trachomatis* infection.
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Introduction

Urogenital disease due to chlamydial infection most often occurs as asymptomatic or mild urethritis and cervicitis, but it can also produce serious sequelae, including endometritis and salpingitis in women, resulting in spontaneous abortion, premature delivery, and ectopic pregnancy. Neonates delivered vaginally from infected mothers may contract chlamydial conjunctivitis or pneumonia.[1] The number of infections is increasing worldwide from year to year. Since many infected people are asymptomatic, it is difficult to identify those in need of treatment.[2 3]

Several factors may be involved in the acquisition of *Chlamydia trachomatis* infections—the roles of age, sex, ethnic and family status, education, the number of sexual partners, etc have been examined with regard to the development of infections.[4 5]

Only data from small numbers of case studies are available on the prevalence of *C trachomatis* infection among Hungarian STD patients, and in most centres there has previously been no screening for *C trachomatis*.[6] In order to determine the prevalence and some of the risk factors of genital *C trachomatis* infections, we have carried a study among pregnant women attending health centres in different regions of Hungary.

Materials and methods

STUDY POPULATION

The study started in January 1994 and terminated in June 1995 in seven different centres—two in Budapest, and one each in Debrecen, Miskolc, Nyíregyháza, Szeged, and Szombathely. The envisaged sample size was around 700 women at each centre. Asymptomatic, HIV negative pregnant women were recruited in a complaint-free condition and also when complaints arose during pregnancy—intrauterine growth retardation (IUGR), premature rupture of membranes (PROM), spontaneous preterm labour, threatening abortion, and premature delivery. The background data relating to social and marital status and age were recorded.

LABORATORY TESTS

The PACE 2 Gen-Probe based on nucleic acid hybridisation was applied in each centre to detect *C trachomatis*.

STATISTICAL ANALYSIS

An interviewer administered standardised questionnaire was completed. Data management was carried out with self developed software, and statistical analyses with the SPSS software package. Comparisons between groups employed χ^2 tests and Student's t tests. For the examination of trends in the monthly frequencies of infection, we used the moving average and linear regression methods. To obtain an overview of the risk, the data were cross tabulated in several ways and multiple logistic regression analysis was performed to differentiate between subgroups with various degrees of high risk.[7] Results are presented as percentages, means, and odds ratios with 95% confidence intervals. A probability level of $p<0.05$ was considered statistically significant.

Results

A total of 6161 pregnant women were examined for the presence of *C trachomatis*. The overall average *C trachomatis* infection rate was 5.87%. The monthly relative frequencies of *C trachomatis* exhibited linear growth (R=0.937) (Fig 1). A significantly higher *C trachomatis* infection rate was identified in the Miskolc region (9.88%), where the highest rate of unemployment has occurred in Hungary in the past few years (table 1). The difference between the ages of the *C trachomatis* infected

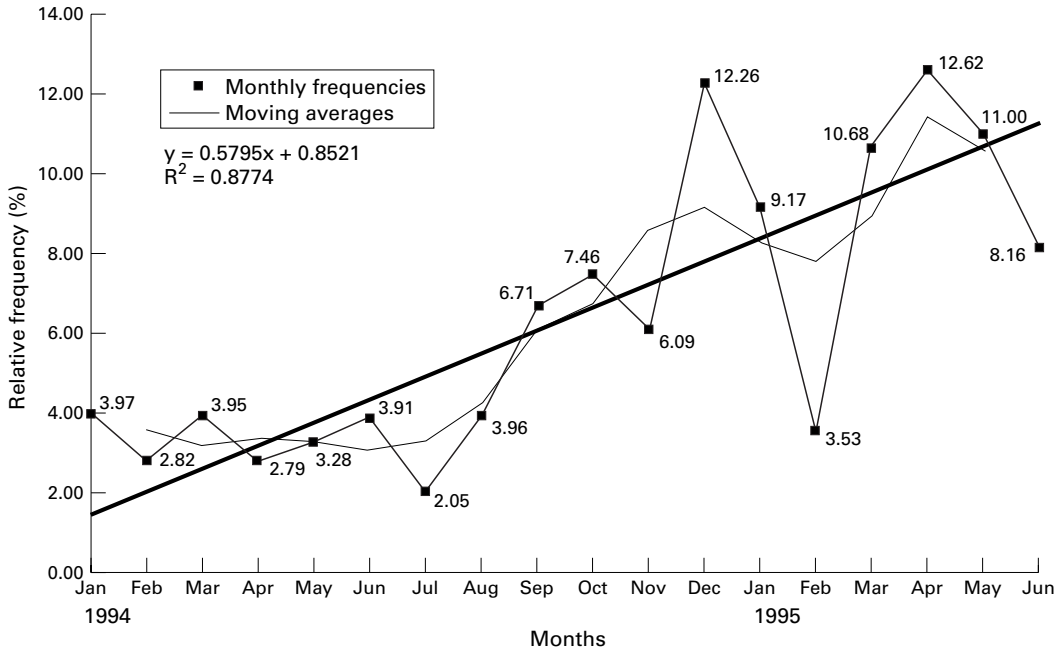

Figure 1 The monthly relative frequencies of C trachomatis infection in Hungary between January 1994 and June 1995. The trend was fitted by using moving averages.

patients (24.48 (SD 7.37) years) and the non-infected women (26.27 (6.89) years) was statistically significant (p<0.01).

Certain potential risk factors of the infection were examined. As shown in table 1, a young age, unmarried status, and no previous pregnancies were statistically significant predictors of the infection. Furthermore, the age group under 20 years displayed a very high rate of infection (11.41%). Both univariate and multivariate analysis indicated that the taking of antibiotics during pregnancy (to treat infections different from *C trachomatis*, upper or lower respiratory tract infections) did not significantly influence the risk of infection.

The association of symptoms and signs of pathological pregnancy with the probability of chlamydial infection was also examined. In the anamnestic history of *C trachomatis* infected patients, the frequency of premature uterine activity was 8.13%, in contrast with 5.18% in the non-infected group. This difference was significant (p<0.05). There were no significant differences between *C trachomatis* infected and non-infected women with regard to PROM, IUGR, and low birth weight.

The perinatal mortality exhibited a significantly higher (p<0.05) prevalence (8.52%) among *C trachomatis* positive than among negative patients (2.03%). A significantly higher number of babies of *C trachomatis* positive mothers (17.14%) were treated in neonatal intensive care units (NICU) compared with negative ones (6.32%). Congenital pneumonia was identified in 7.14% of the newborns of chlamydia infected women. IUGR occurred in 7.32% and 5.75% of the *C trachomatis* positive and negative cases, respectively.

Table 1 Risk factors for Chlamydia trachomatis infections among 6161 pregnant women. Odds ratios and p values from multivariate logistic regression analysis. An odds ratio of 1.0 indicates the reference category. Data missing in up to 74 women

	No	*C trachomatis positive*	*% Infection*	*Odds ratio (95% CB)**	*Probability level of significance*
Centre					p<0.01
Budapest I	188	15	7.97	2.01 (1.29–3.11)	
Budapest II	683	20	2.92	0.94 (0.66–1.34)	
Debrecen	471	6	1.27	0.49 (0.23–1.03)	
Miskolc	2114	209	9.88	3.01 (2.11–4.47)	
Nyíregyháza	1416	76	5.36	1.19 (1.05–1.36)	
Szombathely	292	4	1.36	0.49 (0.19–1.24)	
Szeged	997	32	3.21	1.0	
Age (years)					p<0.05
<20	743	85	11.41	1.59 (1.34–1.88)	
20–28	3243	176	5.42	0.97 (0.89–1.07)	
⩾29	2175	101	4.64	1.0	
Marital status					p<0.05
Unmarried	1055	89	8.43	1.43 (1.16–1.75)	
Married	5032	273	5.42	1.0	
Previous pregnancies					p<0.01
Primigravida	2515	178	7.07	1.38 (1.13–1.68)	
Multigravida	3625	773	5.07	1.0	

*95% CB = 95% confidence bounds.

Discussion

Numerous surveys have been carried out to study the prevalence of urogenital *C trachomatis* infections. The results of these studies reflect various frequencies in the different countries. Humphreys[8] found that the rate of *C trachomatis* infection in women in the state of Colorado was 7.7% (n=11 793), whereas Ryan *et al*[9] reported a rate of 21.8% (n=11 544). In the present study, examinations were carried out on 6161 pregnant women. The overall rate of *C trachomatis* infections was 5.87%. Because of the increasing trend in the monthly frequencies of positive cases, we consider that the true prevalence of chlamydial infection is higher. In our survey, the age group under 20 years exhibited a very high risk of infection. The prevalence of chlamydial infection was significantly higher in the less developed areas of Hungary, where the unemployment rate is higher than in the western region. Significant differences between married and unmarried women were found in the Hungarian population examined with regard to *C trachomatis* infection.

There was a significant correlation between the *C trachomatis* infection rate and premature uterine activity. Close correlations between the

C trachomatis infection rate and PROM have been described in the literature.[10] The data from our study did not support this. Perinatal mortality as one of the most important features of perinatal care was significantly higher among *C trachomatis* positive patients. A significantly higher number of newborns of *C trachomatis* positive women were treated in NICU compared with negative ones. The babies were generally transferred to the NICU because of congenital pneumonia. The 7.14% prevalence of congenital pneumonia among the babies of chlamydia infected mothers was less than that found by Smith and Taylor-Robinson.[11]

Our examinations did not reveal a significant connection between IUGR, low birth weight, and *C trachomatis* positive cases; this result is similar to that reported by Germain *et al*.[12]

The financial limitations did not allow control of the sexual partners of the infected women. In every case of detected *C trachomatis* infection, we suggested the control and possible antibiotic treatment of the partner.

Since the majority of the *C trachomatis* infected cases were asymptomatic, we suggest the testing of all pregnant women, but we would emphasise the great importance of the screening of unmarried women under 20 years of age before induced abortion, and also screening of the unmarried pregnant population before delivery. Our results have led to screening for chlamydial infections being introduced in all 20 public health centres in Hungary.

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